APRIL 1960

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

VOL. XXV, NO. 9 APRIL 1960

CONTENTS

"Every human enterprise is the blend of a bit of humanity, a bit of soil, and a bit of water."

—JEAN BRUNHES

COVER PICTURE.—Floodwater detention dam on East Willow Creek watershed in Fillmore County, Minnesota, with conservation farming practices shown in background.

Soil Conservation

EZRA TAFT BENSON
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Bureau of the Budget, June 26, 1958.

TOM DALE, Editor

15 CENTS PER COPY $1.50 PER YEAR

FOREIGN—$2.25 PER YEAR

25 percent discount on orders of 100 or more mailed to one address.

All orders for paid subscriptions go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

A Watershed is People, Too

And the People along Mill Creek have "Watershed Religion"

By Roy H. Dingle

A watershed may include farms, forests, highways, bridges, railroads, factories, homes, towns, and many other things. But above all, it includes people. And the way the people think and act usually determines what kind of watershed it is. At least, that's the way the folks who set out to stop the plague of floods on Mill Creek found it.

Mill Creek runs southward through Richland County in western Wisconsin. Its east and west forks converge just above Boaz, a village with a population of about 300.

When Boaz was all but washed away by the 1954 flood, members of the village board saw a possible solution. A straightened stream, they reasoned, would carry more floodwater than crooked, choked-up Mill Creek. But the board could not authorize work outside the village limits. So it asked President Frank Harris to seek the cooperation of Dayton township in a stream-straightening project.

George Smart, chairman of the township board, had a different idea. As a soil conservation district supervisor he had seen flood prevention work in neighboring Vernon County. He knew that when a stream is straightened, it sometimes increases damage farther downstream. He suggested that conservation of the land and the water upstream was the best solution.

Note:—The author is work unit conservationist, Soil Conservation Service, Richland Center, Wis.

At a meeting called to consider flood prevention and watershed protection, about 60 people listened to County Agent John Wilson and me outline a suggested course of action. There was no promise of immediate results. Everyone understood this would be a long-range job. The group chose nine temporary directors, making Frank Harris their first president. Thus the Mill Creek Watershed Association was born.

The new directors studied the watershed. They learned its exact boundaries. They listed the names of the people and discovered happily that sixty percent of the farmers were cooperators with the Richland County Soil Conservation District. They studied tributary streams to learn the value of the resources that were being damaged by floods. They wrote a constitution, enlisting the help of E. O. Baker, erosion control agent of the State Soil Conservation Committee. They learned from Baker what information would be needed in an application for help in developing a watershed plan. The constitution was soon adopted, the temporary officers made permanent, and the lower boundary of the watershed determined. Now people began to take more interest.

To help collect flood loss figures a committee designed a questionnaire, listing all types of flood damage. Then the board of directors, each with a helper, went from house to house interviewing landowners. Farmers, business people, and village residents reported their damages from floods of 1951 through 1954. Town boards, the county highway department, and public utilities also reported. On the final evening the directors and their helpers, with a battery of five adding machines, worked far into the night to convert these individual reports into watershed-wide damage estimates.

Soil conservation district supervisors and watershed directors meet together to plan the Mill Creek watershed project.

During this time a conservation needs committee worked with SCS soil conservationists. Using conservation plans and records of farms, they determined how much conservation work was done on the land and how much was needed. They learned that Mill Creek had a fine conservation record but that much more would have to be done.

Nearly a year after its first meeting the watershed association was ready with its request to the soil conservation district supervisors. The district completed the watershed application and sent it to the Governor.

A task force from State and Federal agencies soon made a field examination of Mill Creek. Their findings were favorable. So when the SCS State conservationist sent the application to Washington, Mill Creek was quickly approved for planning.

An SCS watershed planning party reported that eight to ten floodwater retarding structures could be justified and suggested that arrangements be made for funds with which to buy easements and rights-of-way. The watershed association then asked the Dayton, Akan, Sylvan, and Marshall Townships, the village of Boaz, and the county to raise the needed money jointly.

Appropriating large funds for a small corner of the county was a revolutionary idea for the county board. It was a new venture for Boaz and the townships, too. At a joint meeting to discuss all angles of the project, Foster Patch, watershed association president, advanced two basic principles to justify appropriation of funds by the respective governmental units. First, the flood problem was county-wide. Second, the people benefited would eventually repay in taxes all that was expended for their benefit. Protection from flood damage would increase the value of their properties. The tax base would be protected and increased.

The planning group, recognizing the merits of these principles, suggested that the County be asked to appropriate $7,500 and the townships, with Boaz, an equal amount. Boaz was asked for $1,500. The remaining $6,000 would be appropriated by the 4 townships in proportion to the watershed area in each. The municipalities each voted the requested funds.

The president of the watershed association and a district supervisor sign the application for Federal assistance on the Mill Creek watershed.

Then the problem of easements came up. For the first try, the upper dam of two in a series was selected. It was to be on the farm of an absentee owner but one known as a conservationist. He assented readily. Although he would not benefit from the dam, the damages to his farm would be light.

But the absentee holders of a mortgage on this farm had to be consulted also. They were anxious to get their money out of the farm and suggested damages of $5,000 for the easement. Ten acres of land were affected, all lying in a forty valued at $1,000 in the assessor's books. It was permanent pasture-land that might actually benefit from increased yields of grass after seedings were reestablished.

A second farm was involved at this dam site. The farm belonged to several individuals, most of whom lived out of the State. It proved to be impossible to meet with these people.

It soon became clear that easements could not be obtained on a voluntary basis. The soil conservation districts law in Wisconsin

Farmers, businessmen, and housewives line up to sign the application for Federal aid on the Mill Creek watershed protection project.

explicitly denied districts the right of eminent domain. The ruling principle had been that soil conservation should sell itself on its own merits. But watershed protection and flood prevention were new ideas. Here was a plan for community protection at the cost of damage to a few individuals. Should individuals have power to stop such a community project?

New legislation was clearly needed and the district supervisors sought the help of friends of the project. After several trips to Madison and discussions with many key people, the necessary legislation was introduced by Richland County's own State Senator, Jess Miller. Both houses unanimously passed it. Now the district supervisors had the power to condemn land.

Next, the supervisors visited all structure sites to determine fair damages for each landowner. In preparation for this work standard values of land were set, based upon land capability and present land use. Acreages subject to damage and extent of damage were estimated. A tentative schedule of damages was set for each landowner. Total tentative damages were kept well within the limits of money appropriated.

Now the full-scale job of obtaining easements began. It proved most disillusioning. There were twenty landowners to see. Agreement was reached in very few instances on the first call. It seemed almost impossible for those being damaged to dispassionately agree on a fair value for the land. All too frequently their comments were, "If my neighbors below are going to receive so much benefit, why should I not be paid accordingly? If so much money is going to be invested in this dam, the land on which it is going to be built should be valued accordingly." But finally commitments for easements were obtained for the two small dams in the west branch of Mill Creek.

While the supervisors were busy on easements, the State highway department let a contract for highway relocation and bridge construction affecting one of the dam sites. Fill for the proposed dam would be about eight feet deep above the proposed highway. Something had to be done at once. A discussion of the problem with the County Highway Committee quickly followed. SCS and State highway engineers were informed of the problem.

The highway department was sympathetic with the watershed program and could see that by relocating the highway to make room for the dam, savings in bridge costs could be realized. Since the dam would greatly reduce runoff, the size of the bridge could be reduced. Highway engineers agreed to delay the start of construction when the SCS promised to have plans ready for the dam so that construction could be done simultaneously on dam and bridge.

But buying the easement for this dam proved expensive. The owner would lose most of his valley cropland. His demands were reasonable, however, and agreement was reached. The supervisors were concerned about possible additional costs of the highway relocation around this dam. This cost plus the easement might be embarrassingly high. Their apprehension was relieved, however, when they learned that savings on bridge costs were more than enough to cover the added highway costs. At last it seemed that Mill Creek's luck had changed for the better.

Plans for the first dam were completed and the bids opened in August 1958. Four years to the day from the date of the first meeting to discuss a Mill Creek watershed project, construction was started on the first dam.

No better earthmoving season ever came to Richland County than the summer and fall of 1958. It rained just enough to moisten the soil without stopping the work. The first big dam—all 55,000 cubic yards of it—was completed except for seeding.

Outlet of the Ewers Dam, first of the flood prevention structures completed in the Mill Creek Watershed.

With one dam built and seven to go, everyone now is sure that the project will be completed.

But a watershed project is complete only when it has a going land treatment program to support the structural program. Fortunately, this has not been a serious problem in Mill Creek. More than sixty percent of the farmers in the watershed were conservation farmers at the outset. Since the watershed program's beginning, there have been 36 new cooperators. Basic conservation plans have been developed with 37 cooperators. More than 1,600 acres of contour stripcropping have been established, 700 acres of woodland protected from fire and grazing, 900 acres of pastureland protected from overgrazing, and 60 acres of wildlife areas improved. Three miles of terraces, three miles of diversions, and a mile of grassed waterways have been constructed. Four miles of streambanks have been protected.

Watershed association members picnicking on the Boaz school grounds.

The major land treatment problem has been the woodland. But Mill Creek people have been equal to this task too. They have trebled the acreage of woodland protected from fire and grazing since their organization. "Sugar bushes" for maple syrup have been reopened in the past few years.

Conservation is now a part of living along Mill Creek. Newcomers soon learn that they are expected to farm the conservation way. This is undoubtedly one of the greatest values of the program—it has created what might be called "watershed religion."

TEAMWORK ON DRAINAGE RESEARCH

By William W. Donnan

SURVEYS show that there are about 8 million acres of irrigated land in the West needing drainage and another 8 million acres that would benefit materially from better drainage practices. In addition, many thousands of acres of highly productive land is faced with the potential danger of becoming waterlogged.

The question might be asked, "Why not drain those lands?" The answer is that in many areas we don't know how to drain them. We don't know the cause or the cure! The scientific knowledge of how to drain those areas can only come about through research and the practical application of research principles.

More and more it is becoming apparent that, when water is applied to the land artificially, drainage problems are created. The complex nature of the soils, crops, climates, quantity and quality of water supplies, and irrigation practices make the solution of drainage problems difficult.

When research has been concentrated on a given area or a given

No. 53

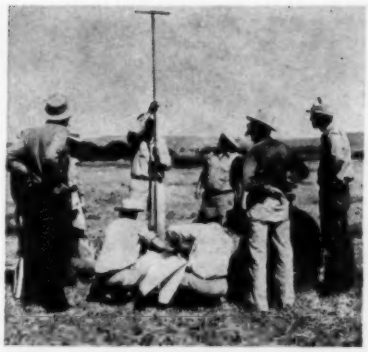
This is the fifty-third of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

Note:—The author is agricultural engineer, Agricultural Research Service, Pomona, Calif.

problem, the results nearly always have been rewarding. In 1941 a team of operations and research technicians from the Department of Agriculture was sent to the Imperial Valley of California to work on that area's drainage problems. Careful investigations, together with trial and application of techniques, have resulted in the reclamation of 50,000 acres of land. Another 100,000 acres has been improved. This means an aggregate increase in return to farmers of about $1 million per year.

Techniques developed for the solution of the Imperial Valley drainage problem have found wide use elsewhere. One example is the use of piezometers in many areas to detect ground water levels and to chart the movement of seepage flow or hydrostatic pressure head. Piezometers were not "invented" in Imperial Valley, but through research and application their use was perfected and adapted to drainage problems. Later, by means of seminars, workshops, and training conferences, the piezometer technique and other scientific principles were given widespread application and trial. This training required teamwork between the Soil Conservation Service and Agricultural Research Service.

In the Firebaugh Soil Conservation District in Fresno County, Calif., there is another example of teamwork to solve drainage problems. In 1953 the people in the Firebaugh-Mendota area organized a soil conservation district. They requested technical assistance in the investigation of drainage problems. This district was provided with a team of SCS and ARS technicians, who made a full investigation. The solution called for a trunk open-drain system and individual farm tile systems designed for specific site conditions.



ARS and SCS seminar group at a demonstration on how to install and use piezometers.

Since there were no tile-laying machines in the area, a team of SCS, ARS, and district men visited tile contractors in other areas to see which type of machine would be best for the local conditions. Shortly thereafter the Firebaugh Soil Conservation District bought its own tile-laying machine. Today they can point with pride to the many thousands of feet of well-designed and properly installed tile drains. Land valued at $500 to $700 per acre is being safeguarded, and the money invested in drainage is paying big dividends in better crops.

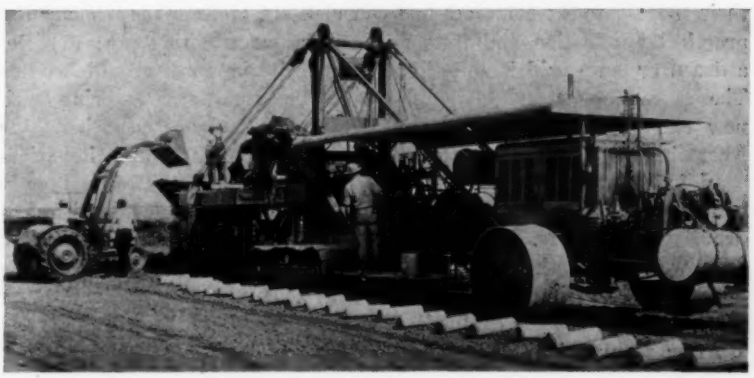
Other places where teamwork on solving drainage problems is now in progress are at Fallon, Nev.; Logan, Utah; Grand Forks, N. Dak.; Fort Collins, Colo.; and the Lower Rio Grande Valley of Texas. The SCS, ARS, and local people at all these locations are working together to solve drainage problems.

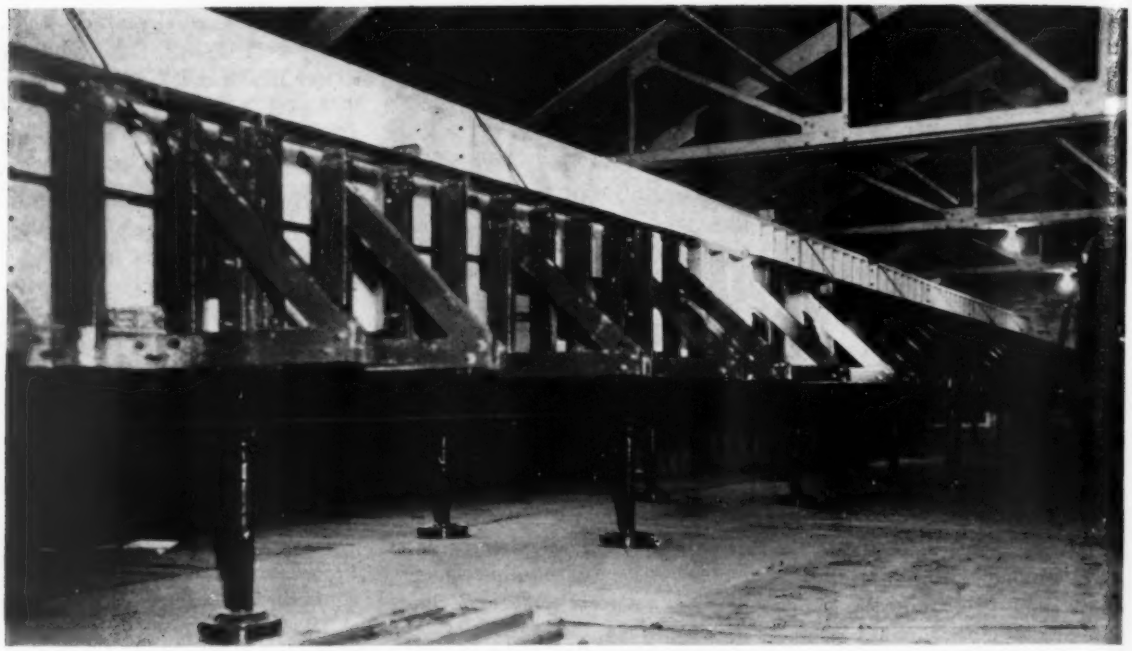
Perhaps one of the most significant examples of teamwork between SCS and ARS occurs in the "Research Needs" program. This program simply means that SCS and ARS get together to determine what the most important technical needs are. In other words, what type of research work should ARS be doing which would be beneficial to SCS? Here are some examples of the way the "Research Needs" program is working in the field of drainage.

In 1954 SCS technicians came to ARS and said, in effect, "We need more information on interceptor drains. How deep should a drain be placed? How far up slope and down slope will a drain be effective? How much water will come out of the drain?"

To answer these questions, the research men worked out theories on how an inceptor drain should work under a given set of conditions. Then they built a large wooden tank 80 feet long, 2 feet wide, and 5 feet deep in the Hydraulics

Tile laying machine owned and operated by the Firebaugh Soil Conservation District.





Tilting, 80-foot-long wooden flume set on jacks and filled with sand for research studies on interceptor drains.

Laboratory at Colorado State University. The tank was built on screw jacks so it could be set on various slopes. When completed, the tank was filled with sand and interceptor drains were installed.

After testing for 6 months, the ARS technicians had most of the theoretical answers on how an interceptor drain functions. Then by teaming up with SCS and the Colorado Experiment Station they took their theories to the field and made practical application and tests on a dozen or more field installations. These techniques and principles now can be applied almost anywhere in the West.

In 1957 SCS said, "We need a better device for measuring hydraulic conductivity. We want an easy, workable method for finding out how fast the water moves through the soil to the drains."

After many trials with various devices, and after much consultation and help from SCS, the research engineers have developed a simple screen, well-point device. This tool is now being given extensive tests in the field by SCS technicians and holds promise of giving excellent results. It will enable SCS to make better on-the-farm investigations of drainage problems and thus help solve those problems.

Other drainage research needs which are high on the priority list for future attention are: (1) Design criteria for open ditches for western conditions, covering such factors as drainage coefficient, side slopes, hydraulics, and investigational methods; (2) Practical methods for estimating quantities of flow to be expected from tile and open drains; (3) More research on gravel envelope filters and other types of filters for drains; (4) Value of "n" for Manning's formula for use in design of tile drains; (5) Protection of drains laid on steep grades; (6) Effects of depth of water table and rates of drawdown on root development and crop growth; and (7) A review of effectiveness of drainage installations in the Imperial Valley.

Research costs money, and returns on the investment can only come about through application of principles to problems. This is why teamwork is so necessary. We can't afford to conduct research and merely write a report. We must carry those research principles to the field and give them tests under field conditions.

How much can we afford to spend on drainage research? If a few cents per acre were spent on drainage research each year on the 8 million acres of land now actually needing drainage, a well-rounded program could be implemented.

The Water Conservation Postage Stamp

THE fact that water is a vital and limiting natural resource is dramatized by the latest in a series of conservation commemorative stamps—the 4-cent water conservation stamp to be issued in Washington, D.C., on April 18, 1960.

The unique two-panel stamp portrays a closeup view of a drop of water falling from a leaf, which symbolizes watershed influences upon water supply. This design leads the eye to a right-hand panel depicting an actual watershed panorama. A town and farm in the foreground are dependent on the upstream watershed with its well-managed farm and forest lands and dams for flood prevention and water storage.

Our national and personal needs for water for domestic use, for sanitation, for manufacture, and for agriculture are multiplied each year by our expanding population.

But there is just so much water. The earth's water supply remains constant. We can meet these vital and rising demands for water only by better use of what we have—by reducing needless waste and pollution—by protecting the watershed upon which our water falls as rain and snow—by finding more efficient ways for its use.

Most problems of water shortage, poor water, or floods trace back directly to the land.

Whether the land in each watershed is eroded or is mantled by a protective cover of grass and trees—whether there are small dams and other flood-preventing structures along the channels—whether steps have been taken to reduce pollution—these determine in a large measure whether water supplies are ample and reliable.

It is because of the dependence of water supply on watersheds that the commemorative stamp will be formally issued at the 7th National Watershed Congress in the Nation's Capital on April 18.

The new water resources commemorative stamp will be available in local post offices on April 19, the day following its official issuance.

Tile Drainage For Citrus

By R. G. Jessup and D. P. Ventulett

THE ever-increasing demand for citrus fruits and the decreasing availability of good citrus land are forcing growers to plant on land considered marginal for citrus production. These lands present such hazards to citrus growth as extreme temperatures, excessive surface and subsurface water, unfavorable soil characteristics, or combinations of these. It is therefore increasingly necessary to select carefully the land that offers the least hazards and try to overcome the hazards that do exist.

H. D. Maguire of Winter Garden, Fla., is trying to solve his problems by choosing lands with a high water table and draining them.

Some years ago Maguire set out 20 acres of citrus on land with a high water table. Due primarily to lack of drainage, this planting was a failure. But because well-drained land in this area sells at premium prices, he decided to try again on the 20-acre block. Maguire, now a cooperator with the Orange Soil Conservation District, requested technical assistance from the Soil Conservation Service for this second undertaking.

The first step in planning was to make a detailed soil survey of the area. The soil was mapped by SCS soil scientists as a fine sand with capability classification IIsw. It is a fairly level, deep sandy soil high in organic matter at the surface. The surface is underlain by a weakly developed organic stained pan. The normal depth to the water table is 18 to 24 inches. Although this soil is too wet for citrus in its natural condition, the texture is such that it drains readily when the water table is lowered.

The next step was to make a field engineering survey and prepare a topographic map of the 20 acres. The topographic map and the soil survey served as the basis for designing the drainage system. Because of the topography, high water table, and soil characteristics, it was determined that both surface and subsurface drainage would be best.

Plans for surface drainage included perimeter ditches, low beds, and pipe drops. The perimeter ditches were designed deep enough to serve as seepage cutoff ditches and to provide outlets for the subdrainage system.

Tiling was selected as the best method of drainage to permit maximum depth for root development with the least loss of land. The planned tile system consisted of nine lines of 4-inch pipe, spaced 120 feet apart. Each line was 516 feet long. The depth ranged from 3.0 to 4.4 feet with the tile grade designed at 0.3 percent to provide for a self-cleaning velocity of flow in the tile lines.

An estimated cost-benefit determination for the project was also made by the SCS technicians. Mr. Maguire considered all the factors and in May 1959 decided to proceed with the project as planned.

Maguire selected a bituminized fiber drain pipe as the type of tile to be used. This pipe is made in 8-foot sections with two rows of 5/16-inch holes spaced 3 inches apart along its length. It is joined together by split couplings.

The wetness of the soil caused a

Note:—The authors are, respectively, agricultural engineer and area conservationist, Soil Conservation Service, Orlando, Fla.

Furrow plowed for alinement of tile ditch on the Maguire place with materials stockpiled along the line.

soft foundation so it was decided to use a 4″ x 18″ blanket of washed and well-graded gravel as the filter and stabilizing material under the tile. A layer of sawdust 8 inches thick and 18 inches wide was used as the filter over the tile.

The perimeter ditches were surveyed, staked, and constructed prior to tiling. The spoil from the ditches was used to fill in low areas in the field. The tile lines were then laid out with center line stakes and offset grade stakes every 50 feet so that proper tile grade and alinement could be maintained.

Several different types of equipment were used in digging the trenches, as local dealers cooperated in making this installation a field demonstration for other interested growers. The back-hoe was considered the best-suited implement where wet conditions were encountered, while trenching machines worked best where trench bottoms were at or above the water table.

The crew required to properly install the tile included an equipment operator, two laborers, and a job foreman. SCS technicians provided assistance in checking the grade and seeing that the job was constructed as planned.

Construction of the trenches was done by starting at the outlet ditch on grade for the first 24 feet where three joints of nonperforated pipe were used as the end section. From this point the trenches were excavated 4 inches below grade and backfilled with the gravel filter. The pipe was then carefully placed to grade on the gravel, making sure that the drain holes were down and that the couplings and pipes fitted snugly. Then sawdust was placed over the pipe and approximately 6 inches of soil was shoveled in by hand to properly bind the pipe in place. After the tile binding was completed the trenches were backfilled and smoothed to the original ground surface by the blade attachment on a tractor.

With tile and sawdust filter in place, laborers shovel in about 6 inches of soil and tamp it to bind the tile.

Tile installation on the Maguire place with gravel bed underneath tile and sawdust filter over it.

Also needed to make the job complete were manufacturers' caps for the upper ends of tile lines, screens for the outlet ends, and a small sand-cement bag headwall to protect the end of each tile line where it emptied into the open ditch.

Tile lines properly installed, as these were, usually require little maintenance. But the tile outlets should be checked after heavy rains to make sure that they have not become clogged and that the outfall ditch is functioning properly.

The total drainage cost of ditches, structures, and tiling was approxi-

mately $218 per acre drained on the Maguire place. If this cost were ammortized at 4½ percent over a 25-year period and an annual ditch maintenance cost were added, it was estimated that an annual production increase of less than ⅓ box of oranges per tree would pay for the drainage system. Mr. Maguire is confident that larger trees resulting from deeper rooting will more than provide the extra production to offset the cost.

With an increasing demand for citrus fruit and a large amount of wet land being planted to fill this demand, tile drainage offers one of the best methods for making these plantings profitable. Even though the initial cost is higher than other methods of drainage, it is not necessarily the least profitable. On the contrary, tiling may well be the most profitable over the years by providing for deeper rooting and permitting larger trees with greater production capacity. Tiling also leaves for trees land that would otherwise be taken up by open ditches.

More Grass The Elko Way

By Herb Boddy

THOSE up-and-coming ranchers in Nevada's Pilot Soil Conservation District are getting just what they went after six years ago—more grass.

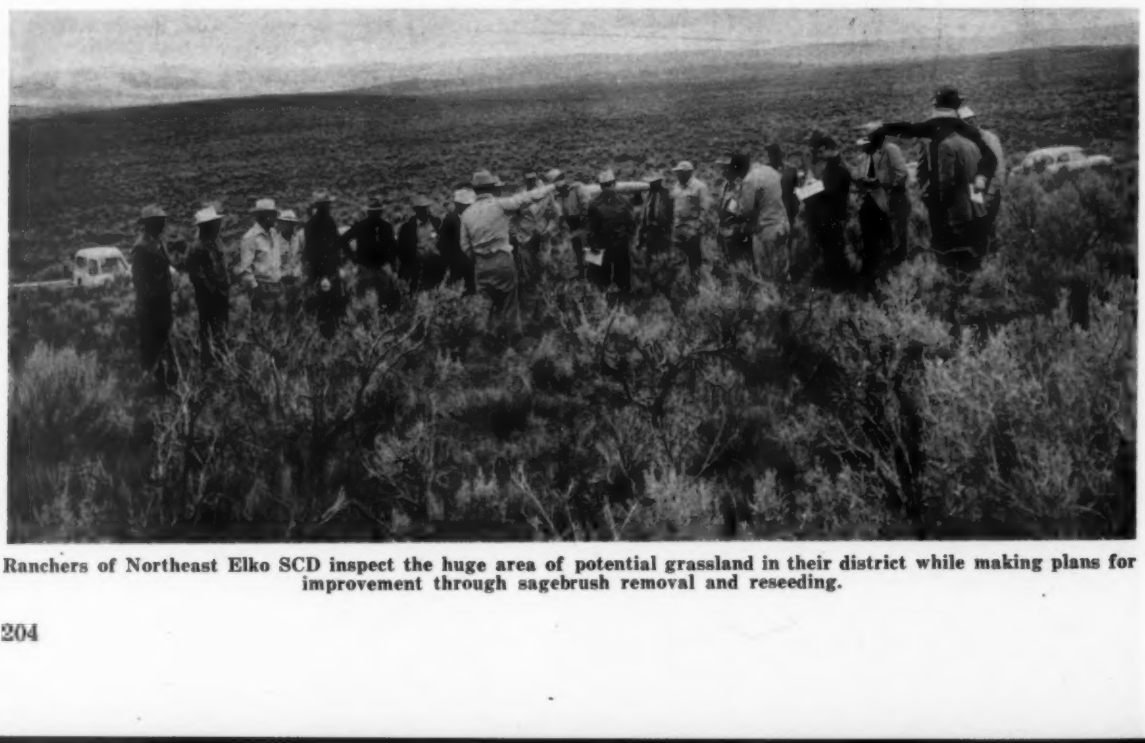
Today, with about a fifth of the big public and private range-building job done, praise is due all hands—ranchers and State and Federal agencies who pitched in and made the "grass revival" go.

The late A. H. "Speed" Agee started things off. At the 1950 Atlanta convention of the National Association of Soil Conservation Districts, he sold the gathering of farmers and ranchers on the idea of public agencies and landowners working out tough range problems team-style.

The next year at Oklahoma City, Speed was successful in getting the Association to set up a "Public Land Committee" with the chief job of grassing-up western rangelands. At its first session, the committee urged the selection of pilot districts in each of the 11 western States.

Pay a visit to the two-million-acre Northeast Elko district and

Note:—The author is information specialist, Soil Conservation Service, Berkeley, Calif.



Ranchers of Northeast Elko SCD inspect the huge area of potential grassland in their district while making plans for improvement through sagebrush removal and reseeding.

you'll find plenty of signs of team action. New grass oases are reaching out. Stock ponds are handy to grazing areas. And miles of new fencing provide grazing safeguards. Conservation work of all kinds is going on. You get the feeling that these rancher-conservationists have touched off a genuine range renaissance in the West.

Of course, not all range acreages are as plush-looking and productive as some of the new grass stands. And many more miles of fencing, plus lots of stock ponds and other improvements are needed. But the ranchers have set their goals and time is on their side.

District leaders and officials of the cooperating agencies—Bureau of Land Management, Soil Conservation Service, Forest Service, Agricultural Conservation Program Service, U.S. Fish and Wildlife Service, Nevada Fish and Game Commission, Nevada Department of Agriculture, and Nevada State engineer's office—would like to move ahead faster. But appropriations, technical assistance, and ranchers' pocketbooks pretty well set the pace.

Fact-finding and planning by technicians laid the groundwork for the range improvements. First, a team of State and Federal specialists prepared a Coordinated Land Program Report of the district's needs and resources. Next, ranch conservation guides for the district's five grazing units were completed. Guides included information on soils, condition of range plants and needed reseedings, stockwater developments, fencing, weed control, and other conservation practices.

The final stage of pilot planning called for preparation of individual ranch plans for each of the district's 34 ranches. Plans included schedules for getting the pasture management and conservation measures applied to the land.

Plowing big sagebrush range in preparation for seeding grass in the Northeast Elko Soil Conservation District.

Nearly all of the Northeast Elko district is range, and most of it is Federally-owned. It's high country and the growing season averages only 95 days.

In that setting, district chairman Eyer Boies figures irrigated hay and pasture yields can be stepped up six times, range production twice. There'll be plenty of top quality forage, too, for turning out early-maturing, heavyweight cattle.

Calculating gains another way, a complete soil, plant, and water management program could boost grazing by cattle and big game from 234,447 — today's mark — to 557,855 AUMs. That 138-percent increase would feed a good many more head. (An AUM is enough forage to feed one mature cow and calf for a month, or approximately 800 pounds of air-dried, nutritious forage.)

This increase of 323,408 AUMs, if converted into cattle, would mean roughly 21,550 breeding cows, 1,100 bulls, and 4,300 replacement cattle. That number of cows should produce around 15,085 calves, allowing for a calving rate of 70 percent.

Cattle grazing crested wheatgrass that was seeded on former sagebrush range in Elko County.

Alfalfa-bromegrass hay field on the Eyer Boies ranch

From this calf stock, count on a loss of 5 percent or 755. So we end up with 14,330 head of 400-pound weaners for sale or replacement. That adds up to 5,732,000 pounds of beef—which at the present sale price of 28¢ would give ranchers about $1,603,960 new income.

A "guesstimate"? Sure! But cattlemen like Eyer Boies, Harvey Hale, Clarence Elquist and H. Vance Agee will tell you there's nothing far-fetched about this reckoning. AUMs are climbing steadily.

So far landowners and public agencies have spent roughly $1.3 million of the estimated $6.9 million cost for completing the job. And they're running a bit ahead of the 35-year completion date that was set by the long-range planners.

Bulldozer-built stock pond on the Salmon Falls River Cattlemen's Association range in Elko County.

Range seedings in the mile-high country are making good headway. Even so, assisting technicians are seeking more palatable, higher-yielding, and larger-growing grasses to increase forage supplies.

For seeding big sagebrush range, in the 8- to 10-inch precipitation belt, crested wheatgrass is now the best bet. Crested produces an average of 250 pounds of usable forage and 15 pounds of beef per acre. Depleted big sagebrush range averages a scant 50 pounds of feed and three pounds of meat per acre.

Crested wheatgrass fields look especially good on the Winecup ranch south of Wilkins, the O. F. and Eyer Boies ranch south of Contact, and the Salmon River Cattlemen's seedings north of there. Whitmar beardless and bluebunch wheatgrasses are highly promising for similar areas.

In the 10- to 14-inch rainfall zones, intermediate and whitmar beardless wheatgrasses are showing promise. Both are more palatable than crested, can be grazed later in spring, and stay green and succulent well into summer.

Siberian wheatgrass is proving the best grass for droughty big sagebrush areas having less than 8 inches of precipitation. It's a little more hardy than crested, and seedlings take root easier.

Tall wheatgrass looks promising on salty sites having supplementary moisture by natural sub-irrigation or applied water.

High-quality winter hay is grown mainly from two mixtures. A mixture of Ladak alfalfa and intermediate wheatgrass is well-suited to the district's poor summer irrigation water supplies. With full-season irrigation Ranger alfalfa and Manchar alfalfa have given excellent yields. On slightly wet lands a mixture of Ranger alfalfa, alsike clover, reed canarygrass, and manchar smooth brome is the choice.

A lot of the progress in this pilot district can be attributed to the new form of grazing allotments. For years groups of ranchers shared the public range together. Now that individual grazing rights are assigned, new opportunities are offered for ranch planning. Cattlemen can fence their allotted space and tackle range problems with the assurance that they'll reap returns from their conservation work.

All of the district's ranchers are actively and enthusiastically backing the range-building program. The last hold-out rancher finally joined forces after five district people called and explained pilot aims.

There's a good deal of plain talk going around about this undertaking.

Eyer Boies says his cropland program added 500 tons of hay and range seedings added 1,350 more AUMs. New feed relieved overgrazing.

Harvey Hale raised his hay output from 100 to 250 tons by better irrigation and crop and soil management. And he's gotten more grazing, too, by seeding range and pasture grasses.

Converting native meadows to better-paying haylands and seeding big sage land to wheatgrass really helped Clarence Elquist. He says he's in the cow business to stay and plans to develop more of his range.

And H. Vance Agee, rancher and member of the Nevada Soil Conservation Committee, puts things this way: "I'm just getting started on my soil conservation program. Right now, I am fencing my range allotment and improving stream channels to get rid of surplus water. I've got to do these things and other conservation work to make things pay."

Rejuvenation of a Citrus Orchard

By W. Gayle Diamond

This is how a citrus grove in Pasco County, Florida, looked when it was purchased by J. W. Boulware. The young trees on a periodically wet soil had suffered from "wet feet"—all were stunted and many were dead. Boulware asked the Pasco Soil Conservation District for a drainage plan whereby the orchard might be rejuvenated.

A combination ditching and bedding plan was decided on by Mr. Boulware and SCS technicians. The good trees were removed to another location and the remainder destroyed. An angle-blade bulldozer formed the beds and furrows by pushing dirt from the furrows onto the beds and then leveling the beds. The beds were made 50 feet wide and 2 feet above the bottoms of intervening furrows.

Two rows of young citrus trees were planted on each bed. Water drains quickly from the beds into the furrows and on to the outlet ditches at the edges of the field. Pipes at the ends of the furrows prevent erosion that might occur if the furrows emptied directly into the outlet ditches. A cover crop of hairy indigo protects the beds and furrows from erosion and silting.

Outlet ditches along two sides of the rejuvenated orchard carry excess water to a main drainage ditch and help lower the ground water table for the orchard. The young trees are thriving.

Note.—The author and photographer for this picture story is work unit conservationist, Soil Conservation Service, Dade City, Fla. This sequence of pictures won first place in Statewide competition among SCS employees of Florida for the best photographic essay.

Marginal land made profitable by

Group Action on Sage Creek

By John Noyes

FARMERS of the Sage Creek area in southwest Idaho knew that much of their land was considered marginal. They realized that their land had a high water table. Some contended that proper drainage would lower the water table so they could grow any of the crops suited to the valley. But the very mention of drainage made some of the farmers panicky. "Drainage is out of the question—the cost would break us," several argued. "Why should we install unsightly ditches on our land to help drain the farms of our neighbors," others contended. The big question in the minds of most of the farmers was how a drainage problem of such magnitude could be financed.

This was the situation in February 1957 when W. E. Pickerel, a successful farmer and cattle feeder, called the farmers of the Sage Creek area together to discuss the pros and cons of their drainage problem.

Reports revealed that 25 farmers in the area had around 2,000 acres of land in need of drainage. "Why should our good fertile land be considered marginal just because it is wet?" asked LeGrand Leavitt, an industrious farmer and respected community leader. "Let's do something about our problem," he urged.

The result was that the Sage Creek Drainage Committee was organized with Leavitt as chairman; Alfred Curtis, a farmer-rancher, as vice-chairman; and Pickerel as secretary-treasurer.

The newly-organized group was keenly aware of the responsibility faced in launching the drainage project, and knew that technical assistance would be needed. The committee took the problem to the board of supervisors of the Owyhee Soil Conservation District at Marsing, and Soil Conservation Service technicians working with the district were assigned to help with the project.

The SCS technicians started work on a complete soil survey of the area, and an underground water topography map showing soil types and elevations of the underlying water table. The Gem Irrigation Company assisted by drilling the test holes. The complete investigation extended over two irrigation seasons.

I then met with the district supervisors, the Sage Creek Drainage Committee, and other farmers to plan the drainage project. After considerable deliberation, they agreed that a substantial portion of the drainage job would be done each year until the project was completed. This reasoning "eased the pain," but the project still had to be paid for regardless of time involved.

"We can solve this drainage problem if we all contribute financially, and use our own labor," they agreed.

A working agreement was drawn up between the Gem Irrigation Company and the Sage Creek Drainage Committee in February 1957.

"The first thing that needs to be done is to clean out the Sage Creek channel and other outlet drains so

Note:—The author is work unit conservationist, Soil Conservation Service, Marsing, Idaho.

Farmers of the Sage Creek area inspect irrigation and drainage practices of nearby areas.

we can get rid of the waste water," declared Forrest Thompson, manager of the irrigation company. SCS technicians designed the water disposal systems with adequate spill and drop structures, and work got underway in March 1957. The farmers contributed their labor in staking the drain ditches and assisted in making the survey.

As the drainage work got underway, the farmers started planning their conservation programs with the assistance of SCS technicians.

In the spring of 1957, Owyhee County Agent Ralph Samson and I met with the Sage Creek Drainage Committee to discuss land treatment practices to be followed as drainage work was completed. Samson suggested that a tour be held to permit farmers to visit farms where drainage had been completed, and to inspect improved irrigation practices and reorganized systems.

The tour included a stop at the farm of Allen and Pete George to inspect a tall wheatgrass planting on salty land. The Georges were county and divisional Grassmen of the Year winners in 1957. The brothers explained that after their land had been leveled, they installed 12-foot border dikes and flushed the salt out of the soil. Then tall wheatgrass was sowed at the rate of 10 pounds per acre with a fertilizer spreader and worked into the soil with a spike-toothed harrow. They had reclaimed 20 acres by this method.

The brothers reported that as soon as a good stand is obtained and the soils show signs of improvement, the grass is plowed under and improved grasses and legumes are seeded. On 13 acres of their improved grass-legume pasture the production was 7,116 cow-days with an income of $3,900.70 above feed costs during the pasture season.

The enlargement of two miles of existing drains and the Sage Creek channel were completed in October 1958. Then two miles of open drains and 1,770 feet of tile drain were completed in December 1958. A continual flow of 20 miner inches of water is estimated in the 1,770 feet of 8-inch drain tile.

Some of the farmers plan to install tile drains on their farms. H. C. Albrecht says, "I'll install tile drains throughout my place. The land I'll save by not having to use a huge open drainage ditch will more than offset the cost of installing tile drains, the way land prices are these days."

Leavitt, chairman of the Sage Creek drainage project, said the group aims to complete the drainage project by 1960. Then it will be a maintenance job to keep the open drains in operation. Periodic tests will be made to determine the effectiveness of the drains installed. On-site assistance will be given by the SCS and county agents to the farmers in reclaiming and managing the land after drainage.

In gathering information on which to base conservation farm plans, conservationists learned that Sage Creek was a natural site for alfalfa seed production.

The alkali bee, which pollinates the alfalfa bloom, is of major importance in profitable seed production. A characteristic of the alkali bee is that he nests in most alkali soils. Therefore, considerable care had to be used in locating the drains in order not to disturb the alkali bee nests.

Since the drainage program was begun, Sage Creek has become one of the outstanding alfalfa seed-producing areas in the country. Fifteen bushels of clean alfalfa seed per acre is not uncommon. In addition to the seed, 1½ tons of hay per acre is harvested, and alfalfa chaff is used for roughage and bedding. From an economic standpoint, row-crop land has no advantage over the land in the Sage Creek project.

Sage Creek drainage channel is inspected by a group of farmers after enlargement work was completed.

18 Years of Conservation Planning

By Charles Bisbee

CARL KUMMER has a sound and permanent conservation program on his 800-acre farm near Waterville, Wash., mainly because he has developed it gradually over a period of 18 years. And he is still planning further improvements.

Kummer got his degree in agriculture from Washington State College in 1937, and worked as a field representative of the Agricultural Conservation Program for 4 years before he became an active farmer.

In 1941 Carl took over the operation of his present holdings. Production from the farm was above average for Douglas County at that time, but there were some serious erosion problems. Nearly all fields had been in continuous wheat-fallow for years and many new gullies were developing.

Note:—The author is work unit conservationist, Soil Conservation Service, Waterville, Wash.

In 1942, Kummer became a cooperator with the Douglas Soil Conservation District and started developing the conservation program he is still working on.

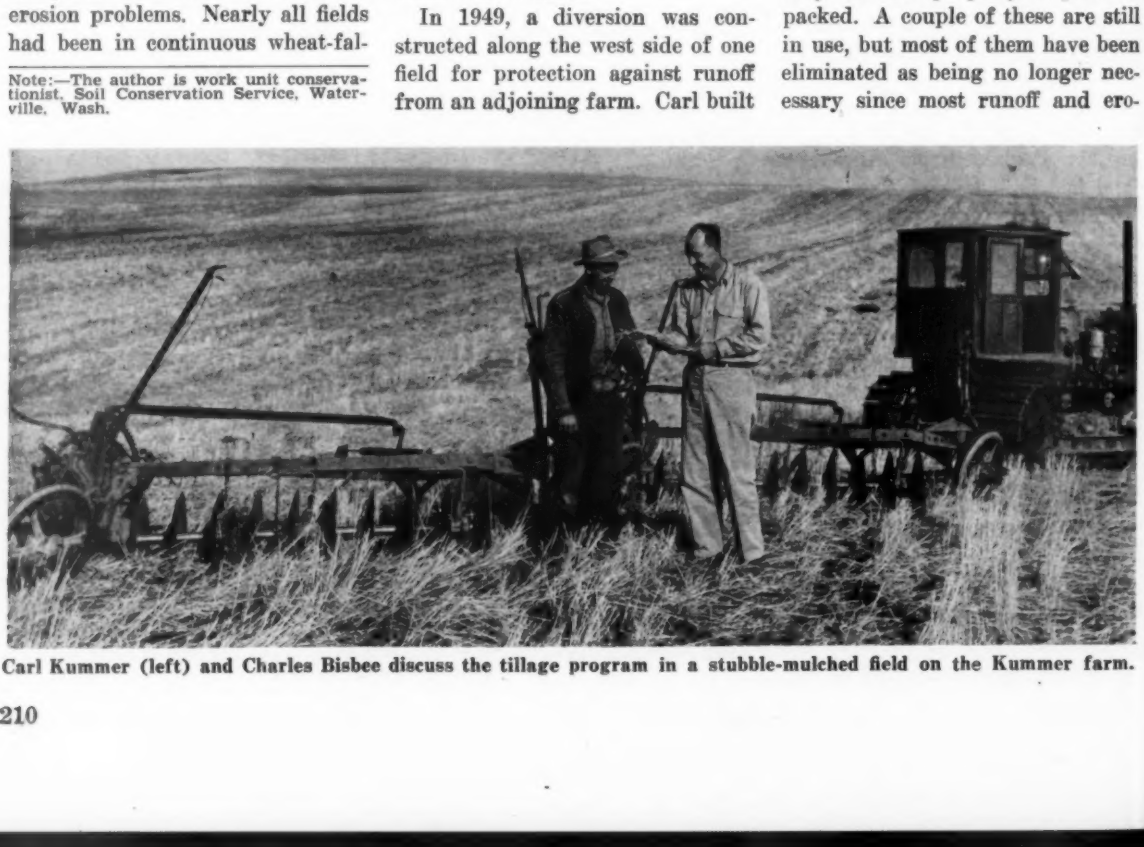
One of the most necessary practices Kummer uses is stubble mulching. He has applied this to all of his land, and now has two complete sets of tillage implements. Sweeps and chisels are used most of the time, with a disk outfit for use when heavy stubble needs to be cut.

In 1942, a sandy field near the farmstead was seeded to alfalfa and grass—partly to maintain milk cows and partly to protect this area from wind erosion.

In 1949, a diversion was constructed along the west side of one field for protection against runoff from an adjoining farm. Carl built another diversion in 1956 in a field near the farmstead, to divert runoff from this field into an area of established grass.

In 1950, Kummer built a rock-wire revetment on the curve of the main waterway through his place and planted the banks to reed canarygrass. This revetment was damaged severely by exceptionally high water the next year. In the meantime Carl had acquired a bulldozer, so this channel was reshaped. He set up a temporary sprinkler system and was able to establish a good growth of grass which provided satisfactory protection.

Kummer has seeded several field gullies to alfalfa and grass after they had been properly shaped and packed. A couple of these are still in use, but most of them have been eliminated as being no longer necessary since most runoff and ero-



Carl Kummer (left) and Charles Bisbee discuss the tillage program in a stubble-mulched field on the Kummer farm.

sion are now controlled before reaching these waterways.

In 1951, Kummer was one of five farmers who traveled into southern Idaho to observe the stripcropping established in that area. Four of these farmers, including Carl, started contour stripcropping in 1952. The following year, Kummer established his second field and each succeeding year added another until every field of his farm now is operated by this system. Besides the other advantages of strips, this has served to eliminate several field gullies.

Partly because of the effectiveness of his strips, Carl has been instrumental in helping to establish this practice on his neighbors' lands. He and the other pioneers in this work now have the satisfaction of seeing 18 cooperators of the Douglas district with stripcropped fields.

One conservation recommendation, which receives considerable lip service but too little application, has been the use of grass as a rotation crop for soil improvement. The early history of Douglas County, as well as experimental information, shows that this is a necessary part of a permanent agriculture for this area.

In 1956, when Kummer started field seedings of grass in a rotation system, he was one of only six operators in the county to have this practice on his farm.

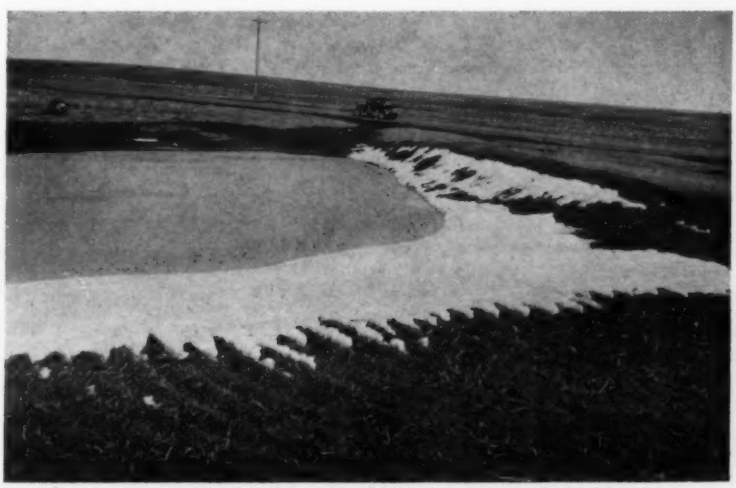
In line with the rotation idea, Carl has made seedings for the past 3 years and plans to make others.

Despite the application of these many practices, Kummer is dissatisfied because some water is still escaping from his land. He consulted with the SCS conservationist and the district supervisors, and they agreed that some water could be saved and a measure of flood control achieved by building small detention dams in strategic locations.

Contour strips of stubble mulch hold snow on the Kummer farm.

In 1954, Carl built an earth-filled structure adjacent to the graveled road bordering his ranch. This was installed with an 18-inch drop-inlet to serve a twofold purpose. First, it retains a permanent pool which soaks away at that point; and second, it has a flood-control pool 3 feet deep above the regular depth which is drained by the 18-inch outlet. After watching the successful operation of this unit during two periods of spring runoff, Kummer has installed three more units in other fields.

In small draws in the fields, Carl has built 14 small fills which he hopes will hold the accumulated water on the fields. The idea is experimental and observations will determine whether it should be extended further.



Pond and flood-detention dam with 18-inch outlet on the Kummer farm.

Vertical Expansion Through Conservation Planning

By Bill Hensley

Albert Tibbe (right) and SCS technician inspect a broad-base terrace and contour planted corn in a formerly gullied field.

IN 1948 Albert Tibbe bought a 120-acre farm in Brown County, Ohio. It was so badly run down from years of hard farming and the yields were so low that he realized something had to be done.

Tibbe recognized that the 120 acres were not producing enough to support him and his family. As he saw it, he had three choices: (1) to take a part-time job in industry, (2) to increase his farm acreage, or (3) to make the 120 acres produce a higher net income. He chose the latter course, and set out to improve the land and its productive capacity. He calls it vertical expansion.

In the spring of 1949 Tibbe contacted the Brown County Soil Conservation District and soon had signed an agreement with it. The district gave him priority for technical help from the SCS technicians serving the district.

When the soil survey and land capability map of the farm had been completed, Tibbe worked with the SCS technicians in making a conservation plan for the farm. The plan included grass waterways, terraces, contour tillage, drainage, and a conservation rotation that called for improved varieties of grasses and legumes on the cultivated fields.

A farm pond was designed, built, and stocked with fish. Multiflora rose hedges were planted around the pond and in other places Tibbe wished to protect from livestock and maintain for wildlife cover. Tibbe does not mow his fence rows and ditch banks until after small grain is harvested so the wildlife will have escape cover during mowing and baling operations.

The woodland had possibilities, and Tibbe put the winter months to good use. He built fences to keep the livestock out and cut and removed dead, defective, and mature trees. He used the sound lum-

Note:—The author is work unit conservationist, Soil Conservation Service, Georgetown, Ohio.

Grass waterways on the Tibbe farm where formerly the gullies were deep enough to hide a tractor.

ber thus harvested to build and repair the farm buildings. He has increased his lumber output to almost twice that under previous management.

Former yields on this farm were about 35 bushels of corn and 15 bushels of wheat per acre, but Tibbe now produces an average of 80 bushels of corn, 25 bushels of wheat, and 2½ tons of hay per year for each acre cropped. With lush, well-cared-for pasture, each acre is producing adequate grass and legumes for a unit of livestock.

His farm now carries 6 dairy cows, 30 beef cows, 4 brood sows, and 65 pigs to market size. He keeps about 300 chickens for egg and meat production.

The soil loss on this farm has been reduced from 10 tons to less than 1 ton per acre per year.

The Tibbe farm is typical of many farms in this area where corn production has increased from an average of 35 bushels in 1945 to 56 bushels per acre in 1957. Yields of other grain, hay, and pasture crops have shown similar increases during this period. Most of these increased yields have stemmed directly or indirectly from the conservation farming practices now in use. More lime and fertilizer, better grasses and legumes, conservation rotations, stripcropping, terraces, grassed waterways, and other soil- and water-conserving practices have helped make this vertical expansion possible for these farms. It has meant an agricultural revolution for the area.

With the increasing crop yields and decreasing soil and water losses has come a higher standard of living for Tibbe and his neighbors who are following similar conservation plans. Most farmers of the area are no longer looking for part-time or full-time jobs in the industrial centers of the State.

A Farm With No Plowland

By Leon J. Sisk

APPLE Valley Farm, nestling in the shadow of Mt. Mitchell, in western North Carolina, is sometimes called "The Farm Without A Plow."

"I could probably find several plows if I looked hard enough for them," says Robert Phillips, owner of the farm, "but they are very seldom used. Except for a vegetable garden there's very little plowed land on Apple Valley Farm. A plowed field is an engraved invitation to the soil to wash away."

It's Phillips' theory that wherever there is bare, plowed land there's bound to be soil lost at some time or other.

"One year out of every two or three there'll be enough rain for it to wash badly," he says. "That's why I don't stripcrop. Stripcropping is better than plowing a field solid, but a farmer can't plow the cultivated strips narrow enough not to lose some soil if it rains hard enough or long enough."

There's no bare land on Apple Valley Farm. Trees are growing on land too rough to graze. Where Phillips can use a tractor and baler he's growing alfalfa. He puts grass on the "in-between" land where it's difficult to harvest hay or silage, and leaves it there permanently.

Phillips has land that has been in grass for 25 years. "With proper fertilization and rotation grazing, grass can be grown year after year in this part of the State," he says. "All it needs is lime and phosphate, and the regular use of a mowing machine to keep down weeds."

A grass-and-clover mixture is sown in the apple orchard strictly for soil protection. Phillips never takes hay off his orchard land. He cuts it three times a year but leaves it on the land as mulch.

He says that he has never had any noticeable decrease in the apple crop because of dry weather.

Note:—The author is information specialist, Soil Conservation Service, Spartanburg, S. C.

The apple trees are less than 2 years old but the grass cover crop is 25 years old on this sloping field of Apple Valley Farm. Only small areas of grass were disturbed when the young trees were planted.

"The grass-clover mulch is the reason," he points out. "Practically every bit of the rainfall is taken up by the soil, and with a thick layer of grass mulch on the ground, very little moisture is lost from evaporation."

There is a soil and water conservation plan for Phillips' farm, which he follows carefully, developed by him and Ray Bryant, SCS technician in the Mitchell County Soil Conservation District. Although Phillips has been a conservation farmer all his life, he has established several practices since the plan was prepared, including grass waterways, multiflora rose fences, reestablishment of conventional fences on the contour, mulch farming, pasture improvement, and reforestation.

The farm has been designated as a "Tree Farm" under the North Carolina Tree Farms System because of Phillips' forward efforts in reforestation and woodland management.

In addition to the many conservation practices which he has established on his own farm, Phillips has had widespread influence in the spread of soil and water conservation in Mitchell County.

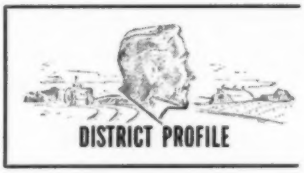
Phillips was a school principal for 25 years and then a county school superintendent, but at heart he has always been a farmer. While a school principal he also taught vocational agriculture. He was a part-time farmer all through his career as an educator but has devoted full time to it for only the last few years.

He specializes in growing apples, and his secondary crop is livestock which he "sort of has to keep" to consume all the grass and hay which he plants primarily as soil cover.

Indicative of his feelings for the soil and soil protection is a dream which recurs quite often to Phillips. In the dream Phillips' farm has washed away and has been replaced by eroded, bare, gullied fields.

"It's more of a nightmare than an ordinary dream," Phillips says, "but I don't mind dreaming it at all because it's such a good feeling to awake and realize that it was just a dream and that the land will be there when morning comes and for all time so long as the conservation practices which I have established are maintained and continued."

Robert and Mrs. Phillips on the lawn of Apple Valley Farm.



A Stemwinder on Dry Creek

IN western Nebraska, six-foot-four, 200-pound Ira Flanagin is considered a good man to have on your side. He's what they call a "stemwinder" in this section of the country.

For the past 30 years Flanagin has been an ardent advocate of soil and water conservation. More recently, he has been a watershed protection man and has faced the challenge of Dry Creek.

Against this "bad actor" he has pitted the same unstoppable optimism he uses to see every job through. And the Dry Creek Pilot project is nearing that point. Land treatment is over 80 percent done—and the 12 major structures built at a cost of $380,000 have been completed.

Flanagin has not neglected his 800-acre wheat, feed, and dairy farm either. But if you review what he has done elsewhere in the community north of Bartley in the past few years you could easily expect he might have had to.

Flanagin has continued his lifelong upgrading of equipment, livestock, and conservation at home while heading the drive to make Dry Creek one of the West's best watershed examples.

On the heels of a communitywide information program used to speed an understanding of the Dry Creek plan among his 328 neighbors, Ira went to work on easements. Before long the sponsors had 40 easements in their pockets and Flanagin had become a notary public in the process.

"Didn't figure it was right to start scurrying around for a notary after a man had decided to sign," Flanagin explained.

When contractors balked at the

Ira Flanagin

prospect of seeding and mulching the slopes of the first three main structures, Flanagin and his supervisor-neighbor, Lloyd Riddle, teamed up to seed and cover-crop the dams.

Flanagin has lived that way all his life. A full-time farmer at 20, he was one of the first 10 cooperators of the Red Willow Soil and Water Conservation District. He built the first terraces and was one of the first to use bench leveling. He contours everything. He is a stickler for stubble mulching, pasture seeding, proper use of grassland, and for good livestock. He has devoted himself to the land, to the crops, and to the livestock to shape his place into a topnotch family farm.

Flanagin was born less than a mile from where he and his wife now live. But his influence is Plains-wide. He has been a supervisor and chairman of his district and, more recently, area director of the State association of districts.

Visitors to the Dry Creek watershed project can well use it to pilot the way in their home communities. If they follow the pattern of leadership Ira Flanagin and his neighbors have shown, success for them will be just around the corner.

—By Herbert I. Jones

Does it pay to prepare fine seedbeds?

Corn and small grain planted in coarse seedbeds yielded almost as well as when planted in finely worked seedbeds, and erosion was much less, according to recent experiments at the Conservation Experiment Station, La Crosse, Wis.

Corn planted on land prepared by normal procedures (spring-plowed and worked several times) averaged about 92 bushels per acre during the 4 years of tests. Planted by the wheel-track method (plowed only), the average yield was 82 bushels per acre. More than 1.75 tons of soil per acre was lost by erosion from the conventional corn seedbed on the average, while less than .5 tons was lost from the wheel-track planting. Runoff losses followed the same trend.

The results were much the same for oats. A conventional seedbed (fall-plowed, then field-cultivated in the spring) yielded about 92 bushels of oats per acre and lost almost 5 tons of soil per acre on the average during 2 years of tests. Plots prepared by field cultivation in the fall and one cultivation in the spring (with corn stover removed) yielded around 81 bushels per acre and lost 200 pounds of soil per acre. When corn stover was chopped up and cultivated in, yield was around 85 bushels per acre and soil loss was practically nothing.

◆

Corn for Green Manure

In recent Illinois tests, an early hybrid variety of corn was drilled at the rate of 4 bushels per acre. It produced 300,000 stalks per acre. In early August, the huge crop of stalks and leaves—about 33 tons per acre—was turned under as green manure.

◆

A Georgia lumber company has developed a circular saw with only one-fifth the number of teeth found in conventional saws. The saw produces chips instead of sawdust, when used on normal-sized logs.

Gypsum for Alkali Correction

Vertical or band application of gypsum to high-sodium soil may provide New Mexico farmers with a cheaper and more efficient method of treating their soils to get better water penetration and root growth, according to laboratory tests at the New Mexico State Experiment Station. Farmers at present broadcast the gypsum over the entire surface of a field, disk it in, and then irrigate to get a chemical reaction in the soil. This method is almost prohibitively expensive on high-sodium soils.

In band application, one band of gypsum is applied to each row at planting time. The effect of the gypsum is concentrated, reclaiming the soil around the plant and permitting deeper water penetration for good root growth. In succeeding years, bands of gypsum can be applied to rows in different locations, eventually reclaiming the entire field.

Dr. Harold E. Dregne, soils professor with the experiment station, believes that with the band method a farmer can reclaim his sodium-affected land in three to four years at less cost with a smaller amount of and more efficient use of gypsum.

International Land Judging Contest

More than 20 States are expected to take part in an international land, pasture, and range judging contest April 28 and 29 in Oklahoma City. Twenty-five representatives from 12 foreign nations have indicated they will participate.

Objective of the event is educational work in soil and water conservation, pasture development, and native grass management.

The six divisions in the contest include adults, 4-H, FFA, women and girls, collegiate, and foreign.

◆

River pollution study

Nature's own method of fighting river pollution will be the object of a three-year investigation by the University of Michigan School of Public Health. Scientists are planning an intensive "health examination" of two Michigan rivers. From their findings they hope to aid the natural self-purification process. The U.S. Public Health Service has approved a three-year grant to support the study.

The first year will be devoted to a survey of lower Michigan to select two rivers for study. Researchers will choose one river which carries domestic organic waste, and another with industrial organic waste.

◆

More than 96 percent of the farms of the United States now have electricity.

Better Alfalfa Silage

Alfalfa makes better silage if finely chopped and bruised, according to recent USDA tests. Scientists harvested third-cutting, unwilted alfalfa with a forage harvester. Part of the alfalfa was cut in 3-inch lengths, and the rest in $\frac{5}{16}$-inch lengths. The finely cut alfalfa was then run through a flail type harvester.

During the silo storage period, the finely cut, bruised alfalfa proved more acid than the coarse silage. It contained more of the desirable acids and less of the undesirable acids in silage.

The scientists feel that bruising the alfalfa helped fermentation of the silage by rupturing the plant cells, thereby producing fermentation faster and differently from that occurring in coarsely chopped silage.

◆

Prefabricated sheets of burlap coated with asphalt are being tested by the Agricultural Research Service as a practical and long-lasting liner for irrigation canals.

◆

Wooden water pipes estimated to be 120 years old were dug up recently in downtown Chicago and found to be in excellent condition, according to the National Lumber Manufacturers Association.

City engineers said the pipes, made from white pine logs 11 inches in diameter with a four-inch-diameter hole, could still be used for their original purpose.

FARM EMPLOYMENT DOWN —EFFICIENCY UP.

The Crop Reporting Board estimates that the farm worker force in 1959 averaged about 7.4 million. This is a 2-percent drop from 1958, and the smallest since the series of estimates began in 1910. In the peak year 1916, the number of farm workers was nearly double the 1959 total. But this reduction in workers did not slow down the Nation's farming; greater acreages of cotton and corn were planted and harvested than in 1958, and farm wage rate levels were at a new high—averaging $0.896 per hour, a jump of nearly 4 percent over the previous year.

◆

Farm population in the United States declined from 25.1 million in 1950 to 21.2 million in 1959. In 1960 less than 1 person in 8 will live on a farm.

◆

About 40 percent of all jobs in the United States are, directly or indirectly, in agriculture. Of the 65 million people employed, about 25 million are in agriculture—7 million work on farms, 7 million produce for or service farmers, and 11 million process and distribute farm products.

◆

Japan's birth rate fell from 34.3 per 1,000 in 1947 to 18.0 in 1958. This was the most rapid decline in birth rate known to history, according to the Population Reference Bureau.